

## National Education to Rise up Sense of Natural Science and Technology through Activity of Measurement

*--- toward the development of science and technology oriented society ---*

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### **Abstract**

*At present, various education systems and the stiles are concerned in each country wishing the development of society. And general saying, the society is going to progress according to the development of natural sciences and technologies. This thing is evident by the fact that the modern information society has been achieving by the development of electronic (particularly semi conductor and IC) technology, communication (particularly satellite communication) technology, and computer technology [1]. Of course it goes without saying that there are the developments of many fundamental natural sciences and technologies on the background that was cultivated in the long time. And more the development of such society will be accelerated by the fulfillment of education that the people live in the society able to have natural scientific and technological knowledge. And the subject matters (substances) of Measurement Science are considered with very fit to the such education.*

*In this paper, the importance of "National Education to rise up Sense of Science and Technology through Activity of Measurement" using the subject matter of Measurement Science is shown wishing more the development of society of developing countries. Here "people" points the people who do not make a specialty of natural science and technology*

**Keywords:** *Measurement Science, People, Natural Science and Technology, Technique, Technology*

### **1. Introduction (Need of "National Education to Rise up Sense of Natural Science and Technology of People")**

"Sense of Natural Science and Technology of people" is an ability to apply the laws and the theories of natural science to human activities and social activities of a man through the technologies. These senses should be cultivated in early time that the wisdom of a man is going to glow. And the wisdom flows from experiences.

Generally National Education is rated with 5 – 6 stages. In the case of our country (Japan), it is shown like Table 1. Here the early stage points are the stage from Pre stage to Third stage. And in the natural science education of those stage, it is normal situation to be done by selecting the contents of education from in physics and chemistry. Sometimes the contents are selected from in biology and earth science. And then the education method to student or pupil of each stage keeps only to be understood themselves of laws, theories, structures, reaction

processes and so on. While in the present, some hardware to apply the laws, the theories and so on is educated with some software to practice the hardware.

Table 1 An example of National Education stages(in the case of Japan)

	Preschool	1 – 3 year	Selection	Early stage education
First stage	Junior school	6 year	Duty	Early stage education
Second stage	Middle school	3 year	Duty	Early stage education
Third stage	High school	3 year	Selection	Early stage education
Forth stage	Junior college	2 year	Selection	Special education
	Technical college	2 year	Selection	Special education
	College	4 year	Selection	Special education
	University	4 year	Selection	Special education
Fifth stage	Graduate school Doctor course	5 year	Selection	Special education
	Post graduate school Master course	2 year	Selection	Special education
	+ Doctor course	+ 3 year	Selection	Special education

But at the education in these stage, the roles, the effects and the worth of theories (and so on) and techniques on a man and human society, and these relations with the development of society are not took up and not educated so strongly.

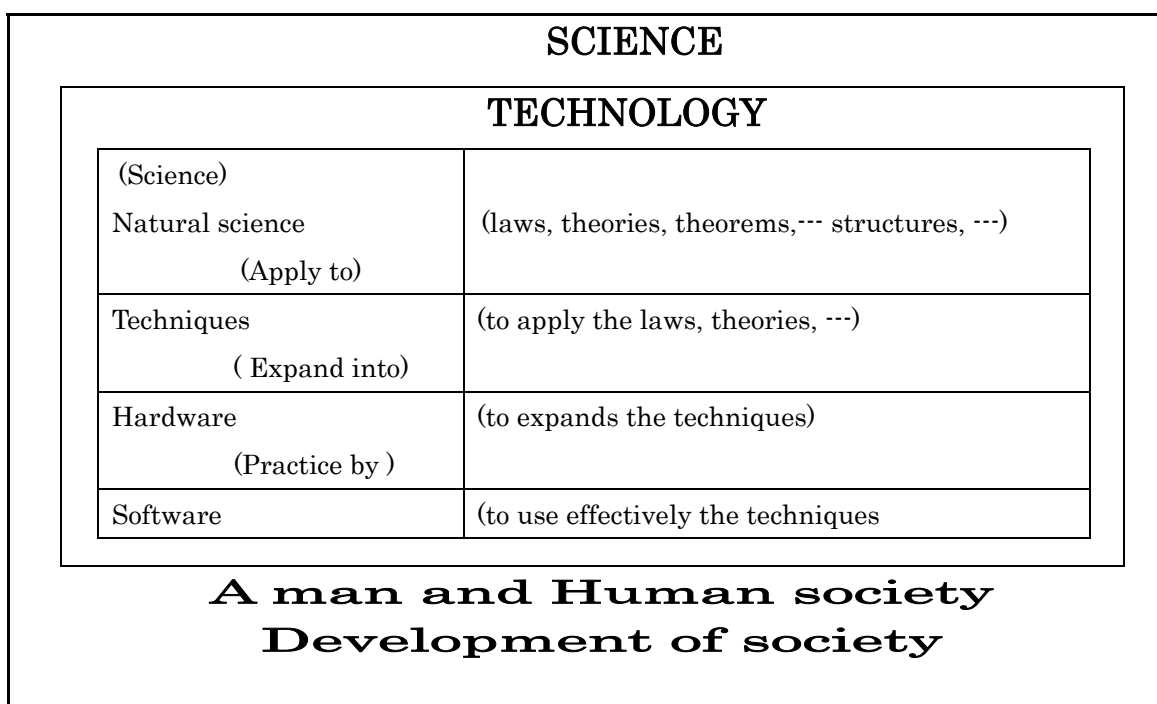
Above mentioned scientific and technological education should be arranged on “National Education to rise up Sense of Natural Science and Technology through Activity of Measurement”. Table 2 is an arrangement of the relation with Science, Natural science, Technique, Hardware, Software, Technology and A man and Human society. This is an important problem and a viewpoint of the difference among “Science”, “Technology”, “Each science” and “Each technique”. And this philosophy gets through to the thought of “Measurement Engineering” and ”Measurement Science”[2].

## 2. Aptitude of MEASUREMENT SCIENCE on the Cultivation of Natural Scientific and Technological Sense

The history of measurement technologies is very old, and the origin is found in the primitive age (hunting age and agriculture age). Here, an act of measurement was existed to keep lower most life of a man. And the acts are for eating a plant and an animal, for avoiding the quarrel in tribe and demonstrating the time of sowing and crop. Also many balances were made in ancient age as the tool to use for various judgment. These facts in primitive and ancient age describe that an act of measurement contributes to the development of society.

Until nowadays the task of measurement had been studying and practicing every time under the background of the development of many sciences and techniques having the relation with human activities and social activities. Typical example of sciences and techniques of the background is shown in the revolution age. Thus, when the subject matters of Measurement Science ( measurement objects, sensors, standards, --- etc) are used as the

Table 2 An arrangement of the relation among Science, Technology and Society



teaching items on “National Education to Rise up Sense of Natural Science and Technology through Activity of Measurement”, the knowledge of people to understand the operation of science and technique for the development of society will be grad up.

The point of agreement of “Measurement Science” are indicated as four items of Table 3 and the each item is possible to explain according to the level and the ranks.

Table 3 The points of agreement of “Measurement Science”

Points	Foundation	Movement
1 The thought of measurement science	Philosophy	Sociality
2 The theory of measurement	Natural Science	Principle
3 The structure of measurement	Engineering	System
4 The technique of measurement	Technique	Each Technique

### 3. Thinking of MEASUREMENT SCIENCE in Early Stage Education emphasized the Relation of Natural Science, Technology and Society

As like above mentioned “National Education to Rise up Sense of Natural Science and Technology through Activity of Measurement” should be done in early stage education. The early stage education is generally practiced as duty in public school education system. And in almost countries it is collect realization that the “Native language”, “Arithmetic”, “Natural science”, “Social study (Sociology)” and “Gymnastic” as basic subjects are set on the early stage education (Junior school and Middle school in Table 1).

On these system, elementary natural sciences and techniques are taught in the subject of “Natural science”. But here, the relation with a man and human society is almost not treated. Then it becomes need and important to concern the method to slot the contents of ‘ The point of agreement of “Measurement Science” ’ in the subjects of traditional early stage education system. There are two methods. One is a method to set “Measurement Science” as new subject adding on the traditional subjects (above mentioned five subjects), and other one is a method to be going put the education items selected from in the contents in to each traditional five subjects. The former has some problems which must be get several agreement of official education organization. The latter is possible to practice in early time by the consciousness of each school and each teacher.

#### 4. Discussion (as Conclusion)

Authors showed that the contents of “Measurement Science” fit to “National Education to rise up Sense of Natural Science and Technology through Activity of Measurement” and proposed two methods to slot the method in the traditional early stage education. In either case, the suitable selection of teaching items should be done on above mentioned thought. And authors would like to indicate strongly that **“Measurement Science” is a Big Treasure Box of Items at National Education to Rise up Sense of Natural Science and Technology**. By showing some examples from ‘ One of experience on “Measurement Science” education for social course and cultural course students ‘ of our University [3], authors would like to recommend “such education. And authors believe that the effects of these education will affect to the development of science and technological oriented society.

**In subject “Social study”** Wisdom of a man and measurement, Action of a man and social activity, Social role and responsibility of measurement, History of measurement, Metrology and trace-ability in society -----

**In subject “Natural science”** Foundation of measurement and standard, Detection and sensor, Foundation of sensor and Physics and Chemistry, Object of measurement, Sensor and signal, Knowledge and information -----

**In subject “Arithmetic”** Analog and digital, Signal and statistics and probability -----

**In subject “Gymnastic”** Body of a man and measurement, Exercise of a man and measurement, Medical and healthcare measurement -----

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